UNITED NATIONS
Office for Outer Space Affairs

International Committee on
Global Navigation Satellite Systems

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United Nations Office for Outer Space Affairs

ICG Executive Secretariat

Space Weather Workshop
14 – 17 April 2015, Boulder, Colorado, USA

United Nations Office for Outer Space Affairs

- The Office **implements** the decisions of the General Assembly (GA) and of the United Nations **Committee on the Peaceful Uses of Outer Space** (COPUOS);
  - COPUOS reports annually to the Fourth Committee of the United Nations GA, which annually adopts a GA resolution on " International cooperation in the peaceful uses of outer space";
- Performs **functions** of substantive **Secretariat** of COPUOS and its Scientific & Technical Subcommittee and Legal Subcommittee;
- **Coordinates** the inter-agency cooperation within the United Nations on the use of space technology (**UN-SPACE**);
- **Maintains** coordination and cooperation with space agencies and intergovernmental and non-governmental organizations involved in space-related activities;
- **Implements** the United Nations **Programme on Space Applications**;
- Serves as **Executive Secretariat** for the International Committee on Global Navigation Satellite Systems (**ICG**);
  - Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space, 1999: " The Space Millennium: Vienna Declaration on Space and Human Development"
  - **Recommendation on GNSS: "...to improve the efficiency and security of transport, search and rescue, geodesy and other activity by promoting the enhancement of, universal access to and compatibility of space-based navigation and positioning systems"**

International Committee on Global Navigation Satellite Systems (ICG)

- **2001 – 2004: Action on Team on GNSS (United States of America and Italy)**
- **2005: Establishment of ICG (noted by UNGA 61/111 of 14 December 2006)**
  - **Promote the use of GNSS and its integration into infrastructures, particularly in developing countries**
  - **Encourage compatibility and interoperability among global and regional systems**
- **ICG Membership:**
    - ***Members:* 9 nations & the European Union**
- **Current and future core, regional or augmentation system providers (China (BeiDou), EU (Galileo/EGNOS), Russian Federation (GLONASS/SDCM), USA (GPS/WAAS), India (IRNSS/GAGAN), and Japan (QZSS/MSAS)**
- **State Members of the UN with an active programme in implementing or promoting a wide range of GNSS services and applications (Italy, Malaysia, United Arab Emirates)**
    - ***Associate Members and Observers:* 21 organizations**
- **International and regional organizations and associations dealing with GNSS services and applications (UN system entities, IGOs, NGOs)**

ICG Annual Meetings

UNOOSA (2006), India (2007), USA (2008), Russia (2009), Italy & EU (2010), Japan (2011), China (2012), United Arab Emirates (2013), European Union (2014), United States of America (2015), Russian Federation (2016), Japan (2017)

2006: Terms of Reference and Work plan

- **Compatibility and Interoperability (USA and Russian Federation)**
  - **Focused discussion on compatibility and interoperability, encouraging development of complimentary systems**
  - **Exchange detailed information on systems and service provision plans and views on the ICG work plan and activities**
- **Enhancement of GNSS Services Performance (India and ESA)**
  - **Focused on system enhancements (multipath, integrity, interference, etc.) to meet future needs**
- **Information Dissemination and Capacity Building (OOSA)**
  - **Focused on training/workshops, promoting scientific applications, space weather**
- **Reference Frames, Timing and Applications (IAG, IGS and FIG)**
  - **Focused on monitoring and reference station networks**

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Providers' Forum

2007: Establishment

- ***Members:*** **China (Compass/BeiDou), India (GAGAN/IRNSS), Japan (QZSS/MSAS), Russian Federation (GLONASS), USA (GPS), EU (Galileo/EGNOS)**
- **2008 : Terms of Reference and Work plan**
- **Agreement that all GNSS signals and services must be compatible and open signals and services should also be interoperable to the maximum extent possible in order to maximize benefit to all GNSS users**
- **Principle of Transparency – every GNSS provider should publish documentation that describes the signal and system information, the policies of provision and the minimum levels of performance offered for its open services**
- **Fourteenth Meeting, 8 June 2015, Vienna, Austria**
  - ***Open Service Information Dissemination, Open Service Performance, Spectrum Protection (IDM)***

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Ninth Meeting of the ICG, European Union, 10 – 14 November 2014, Prague

- **Evaluation and development of Interference Detection and Mitigation (IDM) capabilities**
  - *To evaluate existing and emerging interference detection, localization, and characterization capabilities and consider developing, testing and implementing these or similar capabilities in their nations or regions of the world*
- **Open Service Monitoring Information Portal**
  - *Existing monitoring service centers for GNSS open services establish a link to the ICG info portal designed by the International GNSS Monitoring and Assessment (IGMA) Task Force*
  - *To allow GNSS users worldwide to easily find GNSS monitoring information and products*
- **Interoperable GNSS Space Service Volume (SSV) Characterization Outreach**
  - *To support the SSV outreach by making the booklet on "Interoperable GNSS Space Service Volume" available to the public through their relevant websites once the booklet is available*
- **Support for the UN GA Resolution on the Global Geodetic Reference Frame**
  - *The first geospatial resolution was adopted by the United Nations General Assembly on 26th February 2015*

Tenth Meeting of the ICG

2015: United States of America, 1 – 6 November

- **ICG-10 Local Host:** **University Corporation for Atmospheric Research (UCAR), Boulder, Colorado**
  - Consortium of more than 100 member colleges and universities focused on research and training in the atmospheric and related Earth system sciences
- National Centre for Atmospheric Research (NCAR)
- National Institute of Standards and Technology (NIST)
- National Oceanic and Atmospheric Administration (NOAA)
  - National Space Weather Prediction Centre (SWPC)

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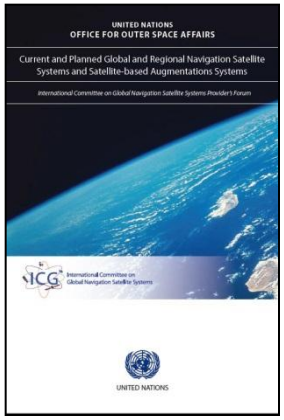
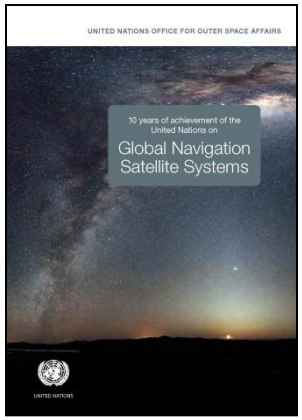
Information Dissemination and Capacity Building

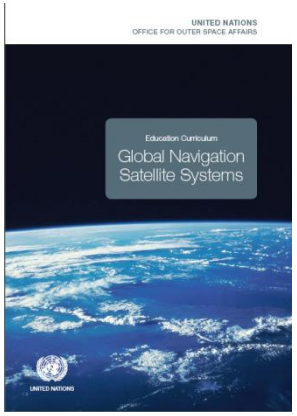
2007: ***The way forward to provide positioning, navigation and timing globally***



2010: ***Report on planned or existing global navigation satellite systems and on relevant policies and procedures***



2011: ***Achievements of providers and users of positioning, navigation, and timing services, under the umbrella of the United Nations, in promoting GNSS over the past 10 years***



2012: ***Education Curriculum and Glossary of GNSS Terms (English, French, Spanish, Arabic)***

United Nations/Italy Long-term Fellowship Programme on GNSS and Related Applications:
Master in Navigation and Related applications (MNA) Programme

ICG Executive Secretariat: OOSA; ICG website: www.unoosa.org

Programme on GNSS Applications

Regional Workshops on the Applications of GNSS:

- ***Zambia and China (2006), Colombia (2008), Azerbaijan (2009), Moldova (2010), UAE (2011), Latvia (2012), Croatia (2013), ICTP (2014), Russian Federation (2015), UNOOSA (2015)***
  - ***increase awareness among decision and policy makers of the benefits of GNSS and develop regional and national pilot projects on GNSS applications, and strengthen the networking of GNSS related institutions in the regions***
- **2015: United Nations/Russian Federation Workshop on the applications of , 18 – 22 May, Krasnoyarsk**
  - **Current and Planned GNSS and satellite-based augmentation systems**
  - **GNSS-based applications**
    - ***Challenges for positioning and navigation in the Arctic***
  - **GNSS and Space Atmospheric Weather Monitoring**
  - **GNSS reference frames/stations and reference station networks**
  - **Capacity-building**
- **2015: United Nations International Meeting on Global Navigation Satellite Systems, 14 – 18 December, Vienna, Austria**

Programme on GNSS Applications (continued)

Promoting the use of GNSS technologies as tools for scientific applications

- ***Reference Frames/Systems:*** ***to provide technical knowledge on the operational and practical aspects and issues relating to references frames, more specifically,***
  - ***facilitate a regional forum for geodetic agencies, improve data sharing (GNSS, levelling, tide gauge, gravity) and dense regional reference frame***
- ***Technical Seminar on Reference Frames in Practice, July 2015, Singapore***
- ***Space Weather and its effects on GNSS (ICTP and Boston College):*** **Space weather, or the Sun's effects on near-Earth space, can cause disruptions and failures of communications satellites in geostationary orbit, particularly elements of GNSS, and can severely damage ground-based infrastructure**
- ***Ionospheric modelling*** ***is an effective approach for correcting the ionospheric range error and improving the GNSS positioning accuracy***
  - ***The abundance of GPS measurements from worldwide distributed GPS reference networks, which provide 24-hour uninterrupted operational services to record dual-frequency GPS measurements provides an ideal data source for ionospheric modelling research***
- ***Workshop on Ionospheric Effects on SBAS and GBAS Applications at Low Latitudes,***

2 – 13 March, Trieste, Italy

- ***Workshop on NeQuick latest development and advanced uses, 4 – 8 May, Trieste, Italy***

Space Weather (STSC agenda item)

- ***2010- 2012:*** ***International Space Weather Initiative (ISWI) utilized the ground-based world-wide instrument arrays under deployment since 2005***
  - ***Bulgarian Space Academy: http://www.iswi-secretariat.org***
  - ***ISWI Newsletter: Kyushu University of Japan***
  - ***Space Weather Schools***
- ***2013: "Space Weather" agenda item at STSC in accordance with GA resolution 69/85***
- ***2014: Expert Group on Space Weather***
- ***2015: United Nations/Japan Workshop on Space Weather: Science and Data Products from ISWI instruments, 2 – 6 March, Fukuoka, Japan:***
  - **to assess the status of ground- and space-based space-weather instruments;**
  - **to discuss data access, analysis, modeling, and interpretation efforts to advance space-weather research and improve space-weather forecasting.**

Space Weather (continued)

- ***STSC-2015, Vienna, 2 – 13 February:***
- ***Workshop on Space Weather services to build global resilience, United States***
  - ***Overview of the broad and diverse SW activities and services currently being undertaken in member States, national/international organizations***
  - ***Maintaining the long-term sustainability of outer space activities***
- ***Expert Group on Space Weather met under the leadership of Canada***
  - ***The mandate is to promote awareness, provide guidance and enable communication and cooperation in space weather-related activities among States members of COPUOS and related national/international organizations;***
  - ***Under the workplan:***
    - ***The Group will examine the guidelines, recommendations and best practices to identify mechanisms, to promote their implementation (Year 1);***
    - ***Identify and assess the role of relevant UN organizations (WMO, ICAO) in the global SW effort, promote coordination and communication between them, and the efforts of STSC are complementary (Year 1- 2);***
    - ***Promote increased and expanded involvement by member States in providing SW monitoring ,from the ground and in space, and in developing, advancing and sharing, and delivering SW services (year 2 – 4);***
- ***Report (A/AC.105/C.1/2015/CRP.27)http://www.unoosa.org/pdf/limited/c1/AC105_C1_2015_CRP27E.pdf***

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Regional Centres for Space Science and Technology Education, affiliated to the United Nations, as Information Centres for ICG

- ***Africa: Morocco and Nigeria***
  - ***Workshop on Space Weather and GNSS, 16 – 21 February 2015, CRASTE-LF, Rabat***
- ***Latin America and the Caribbean: Brazil and Mexico***
- ***Asia and the Pacific: India***
- ***Western Asia: Jordan***

- ***Remote Sensing & GIS, Satellite Meteorology & Global Climate, Satellite Communications, Space & Atmospheric Science and Global Navigation Satellite Systems (2013), Space Law***

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- **As new space-based GNSS are emerging globally, interoperability is the key to "success for all"**
- **ICG is a forum to discuss GNSS to benefit people around the world**
- **Mission Statement (ICG-8) and Vision Statement (ICG-9):**

The International Committee on Global Navigation Satellite Systems (ICG) strives to encourage and facilitate compatibility, interoperability and transparency between all the satellite navigation systems, to promote and protect the use of their open service applications and thereby benefit the global community. Our vision is to ensure the best satellite based positioning, navigation and timing for peaceful uses for everybody, anywhere, any time.

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Executive Secretariat of the
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